

Way to Go, Seattle!

'One-Less-Car' Demonstration Study



APPENDIX C: Report on Results Spring 2001 March 6, 2002 (Revised June 2002)

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Executive Summary

This Executive Summary will be further refined. For now, I have pulled a few of the most compelling graphs from the following report.

The question that arises is whether, and to what extent, the participants simply replaced the use of their own second car with a borrowed car, taxi, or rental car. The question is important because if participants merely replaced trips that would have been made in their own second vehicle with equivalent trips in borrowed or paid vehicles, there would arguably be little or no identifiable benefit in the form of cost savings, pollution reduction, or decrease in traffic congestion.

For this reason, it seemed worthwhile to identify the total miles traveled in all transportation modes that can be characterized as low-occupancy. This includes Car0, Car1, Borrowed Car, Rental Car, and Taxi.

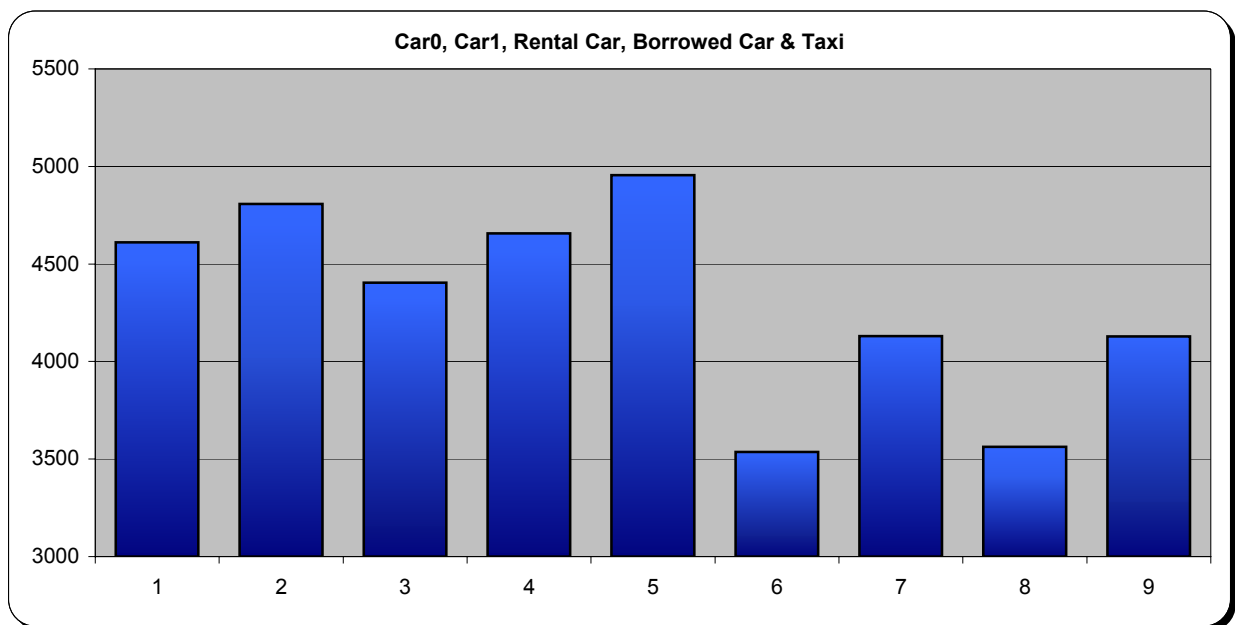


Figure 13: ‘Low-Occupancy Vehicle’ Usage Compared, (All Participants)

For reasons unknown at this point, the participants actually increased their overall use of low occupancy vehicles during the first two weeks of the test period, (weeks 4 and 5). But even with this unexplained variation, the figure graphically demonstrates there was an overall beneficial decrease in the number of low-occupancy vehicle miles traveled, especially in weeks 6 - 9. Arguably the decrease was made up by the increased use of high occupancy vehicles, (carpools and busses), alternative ‘green’ modes of transportation such as walking and bicycling, and/or a decrease in the total miles traveled by the participants.

The question of how participants changed the *amount* they traveled as opposed to the *way* they traveled is one of the more important and difficult issues to analyze. The reality is that participants didn't do just one or the other. Over the course of the six test weeks, every one of the participants cut back on a trip, combined two trips that might have been made separately or postponed a trip, while making "normal" trips using different modes of transportation. The evaluation questionnaires phrased this issue as a choice between two alternatives: Did they stop making trips? Or did they find other ways to make the same trips? The bottom line is, every participant could have answered "both," and many times, did just that.

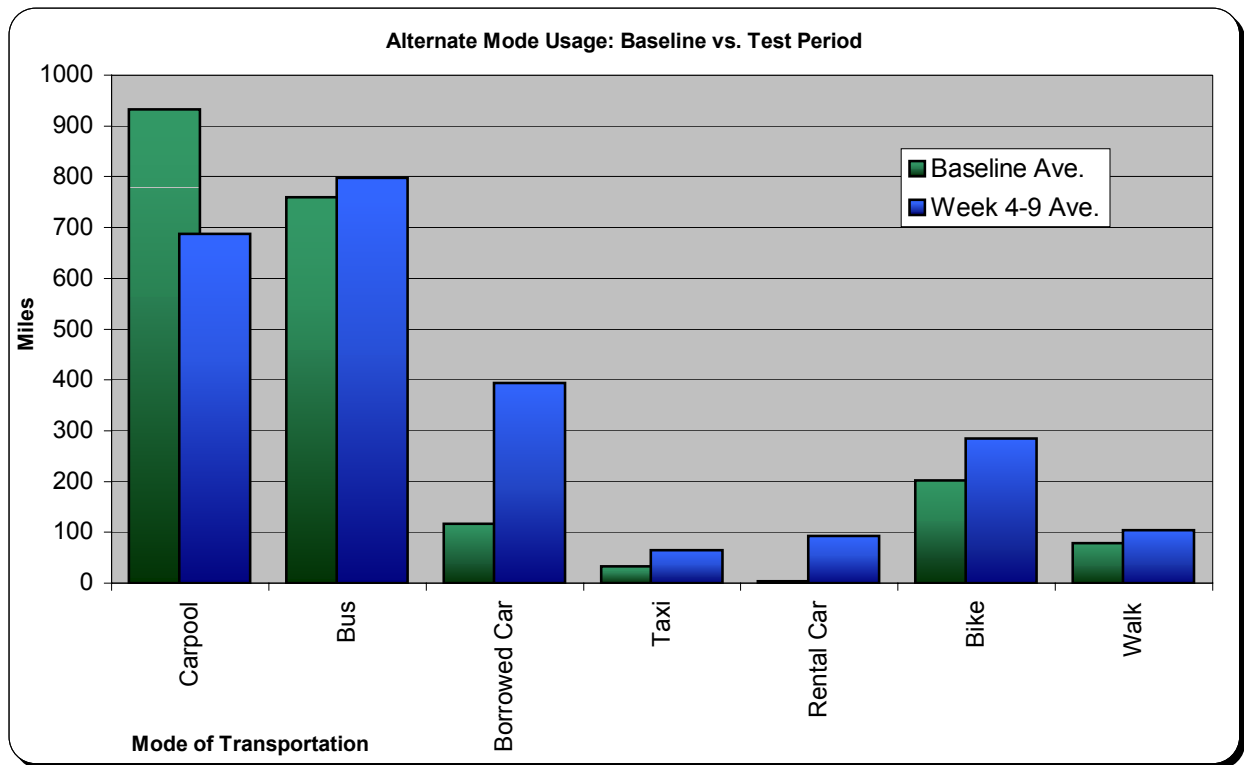


Figure 16: Average Mode Usage: Baseline vs. Test Period, (Alternate Modes - All Participants)

Since the use of owned vehicles tends to overwhelm the data bars for alternative modes of transportation in Figure 14, Figure 16 compares the average weekly miles traveled for only the alternate transportation modes during the baseline period and the test period. Every form of transportation was used more once the participants gave up one of their cars, with the exception of carpool travel (reasons why noted under Figure 6).

Introduction

Note: This report refers to the **Fall 2000 study as Way to Go I**, and to the **Spring 2001 study as Way to Go II**.

Executive Assistance was contracted to provide data analysis for the Fall 2000 and Spring 2001 **Way to Go, Seattle** Demonstration Studies (see accompanying **Way to Go, Seattle** 'One-Less-Car Studies Preliminary Report, Winter 2002 for narrative details). Executive Assistance was also to provide a **Statistical Report** of the Spring 2001 Study, which was conducted between May 14, and July 15, 2001.

Certain limitations should be suggested regarding the importance of different information and relationships in the data. Executive Assistance was not retained to create the study and develop its methodology and does not offer specific conclusions with respect to the data. Rather, the data has been analyzed and presented at the request and direction of the client. The significance of the conclusions and the statistical confidence in correlation and causation are unknown and could only be addressed by further analysis.

Much of the data analyzed is subjective data, based on the beliefs, attitudes, and intentions of the participants. The City is aware that many people believe the cost of their second car is worth the convenience. The Demonstration Studies, in part, hope to show that this belief is not true by helping people recognize the true cost of owning, operating, and maintaining a vehicle. As the City has learned, many people are surprised at the actual cost of owning that extra car, and become open to exploring travel alternatives with or without any additional financial incentive other than savings realized through reducing car ownership.

In short, statistical conclusions that appear in this working paper should be considered tentative. That concern aside, the City has demonstrated that the sample population believes in the benefits being promoted, including lower cost, lower pollution levels, and lower congestion levels. The positive results the Demonstration Studies continue to achieve suggest that further study of the data and continued research will prove interesting and useful.

Basic Graphs of Transportation Mode Use

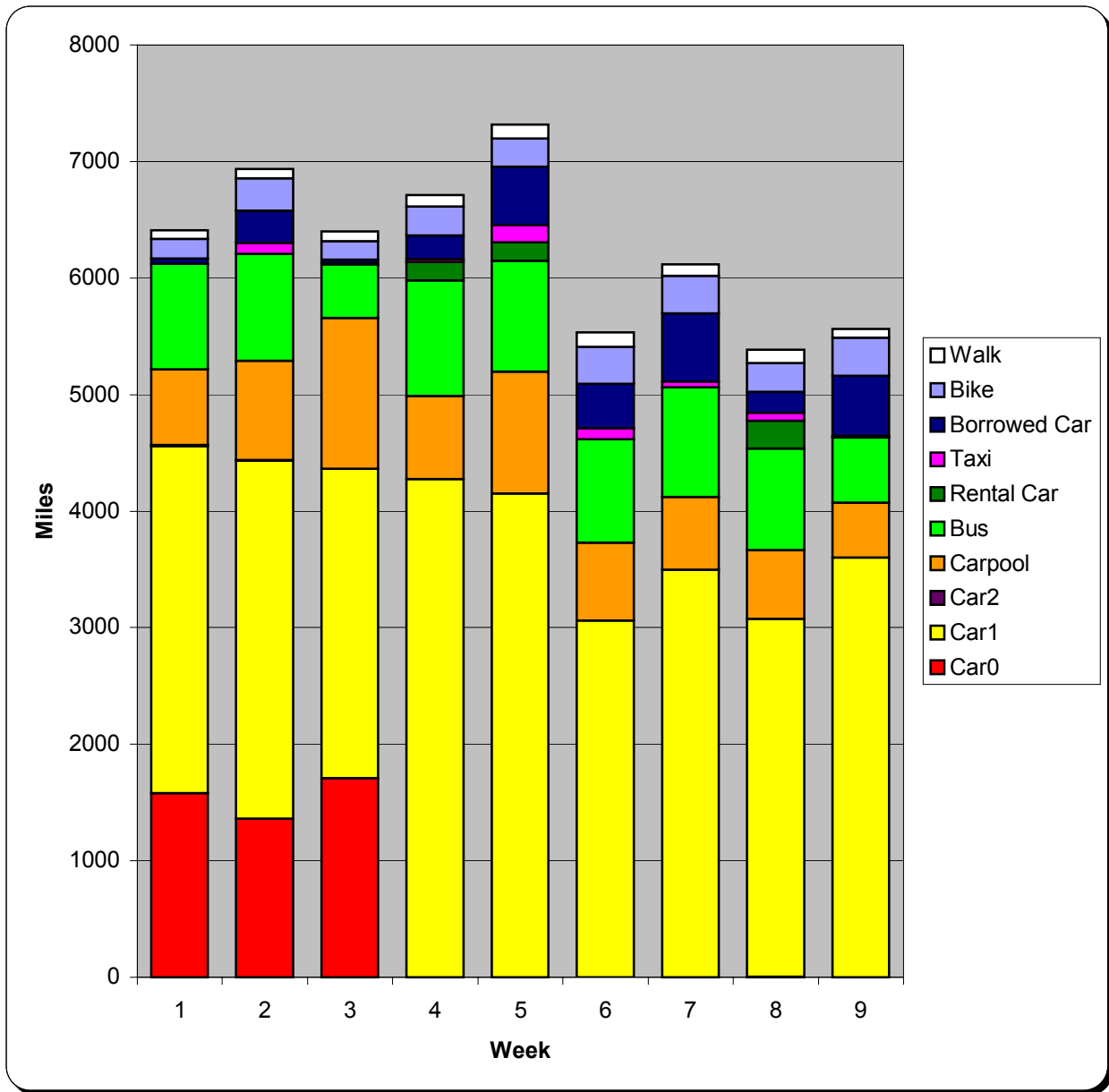


Figure 1: Miles Traveled: All Modes, (All Participants)

All transportation modes recorded in the study are reflected in the above graph. The miles shown on the 'Y' axis represent the total miles traveled by all participants during the week. A recurring issue in the analysis is why overall travel increased in weeks 4 and 5, before the end of school and after participants gave up one of their cars, yet it didn't increase by car. Note; there was one household with a car 2, but it was only driven 8 miles during the entire nine-week period.

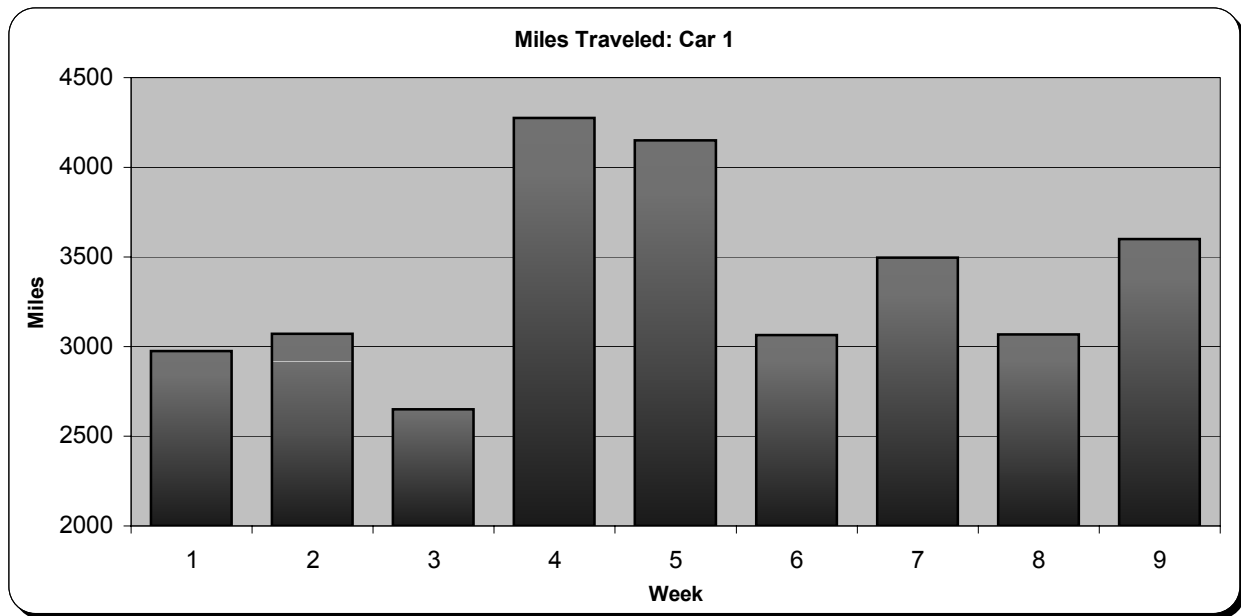


Figure 2: Miles Traveled Using Primary Car, (All Participants)

“Car1” was the designation used in the study to refer to a participant’s primary vehicle. The use of primary vehicles increased significantly following the baseline period, as participants apparently combined trips previously made with Car0 as well as Car1. The use of the primary car then dropped significantly as participants explored alternate transportation methods as well as making fewer overall trips.

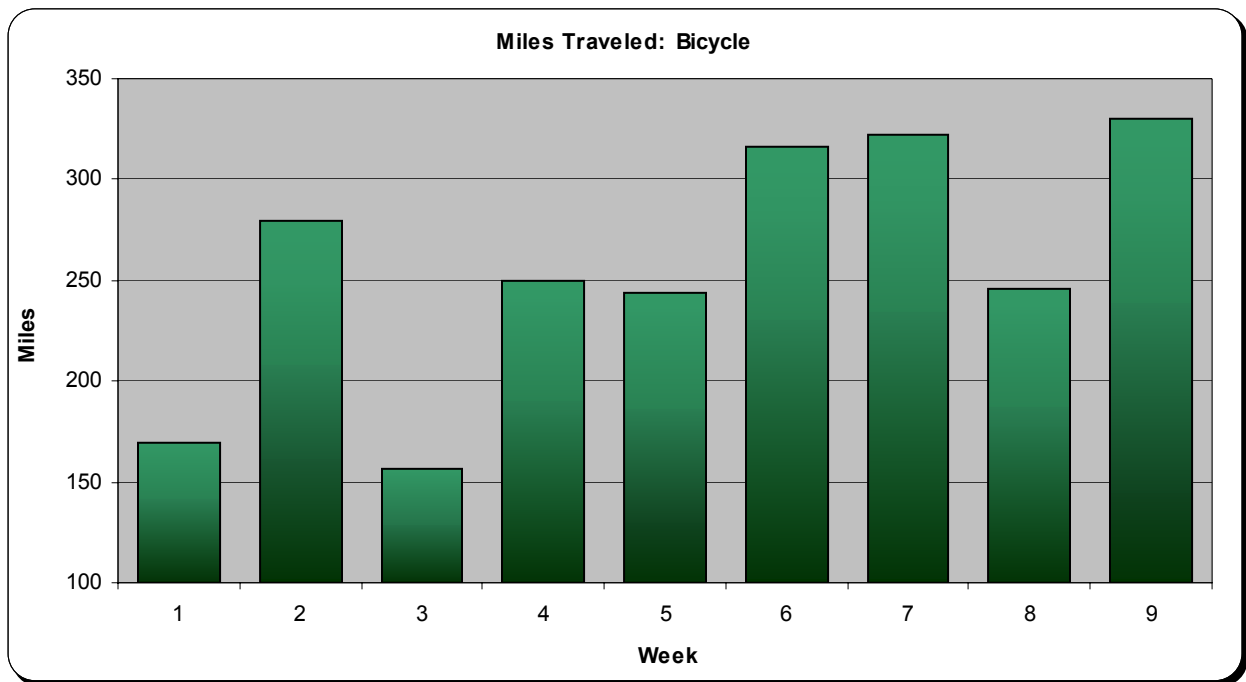


Figure 3: Miles Traveled Using a Bicycle, (All Participants)

The usage of bicycles as a travel option increased following the baseline period.

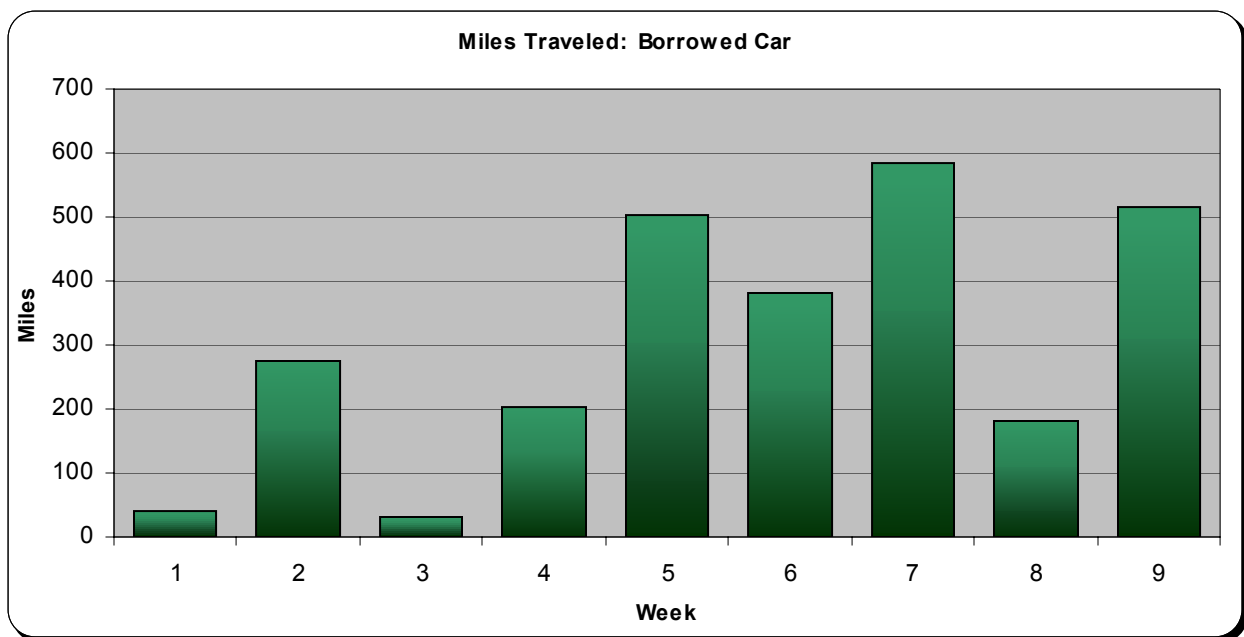


Figure 4: Miles Traveled Using a Borrowed Car, (All Participants)

As reflected in the above graph, participants appeared to make use of a borrowed car much more frequently during the test period than they did as a matter of normal practice.

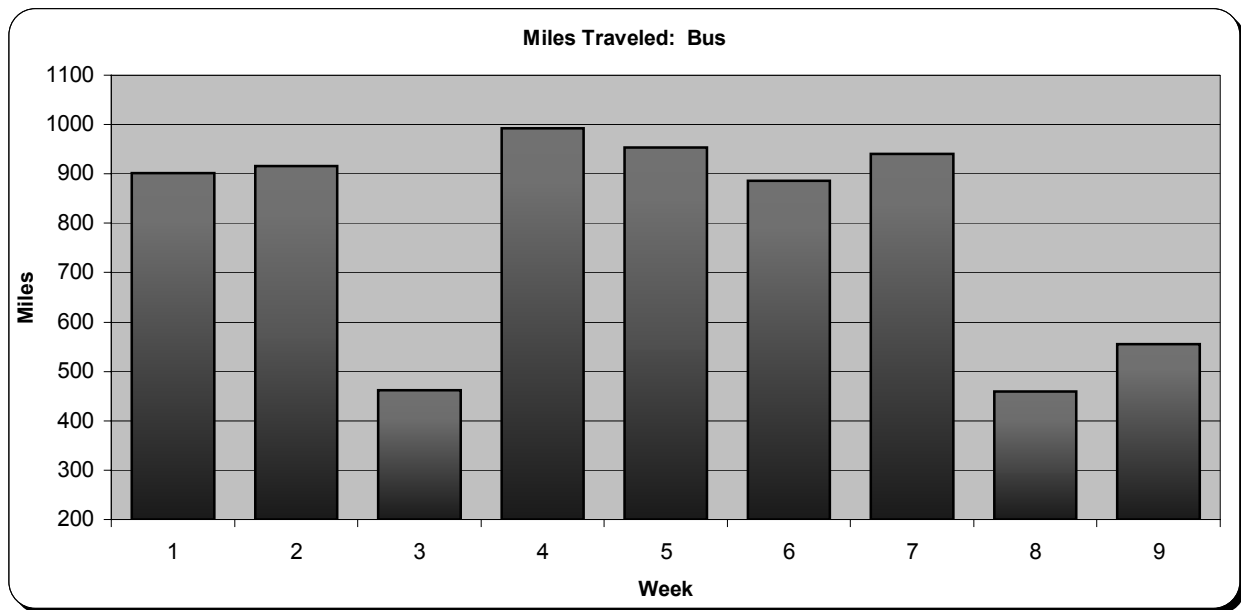


Figure 5: Miles Traveled Using the Bus, (All Participants)

The use by participants of bus travel did not vary substantially between the baseline and test periods. It is noted that one of the participants, Dalton of the Koch household, accounted for a large majority of overall miles traveled by bus. During week 3 this participant utilized Car1 a significant amount rather than the bus. During week 9 this same participant was on vacation and therefore did not perform her usual commuting rituals. Week 8 included the 4th of July holiday and several participants were vacationing and not utilizing their typical patterns of transportation. These anomalies are visualized in the graph above.

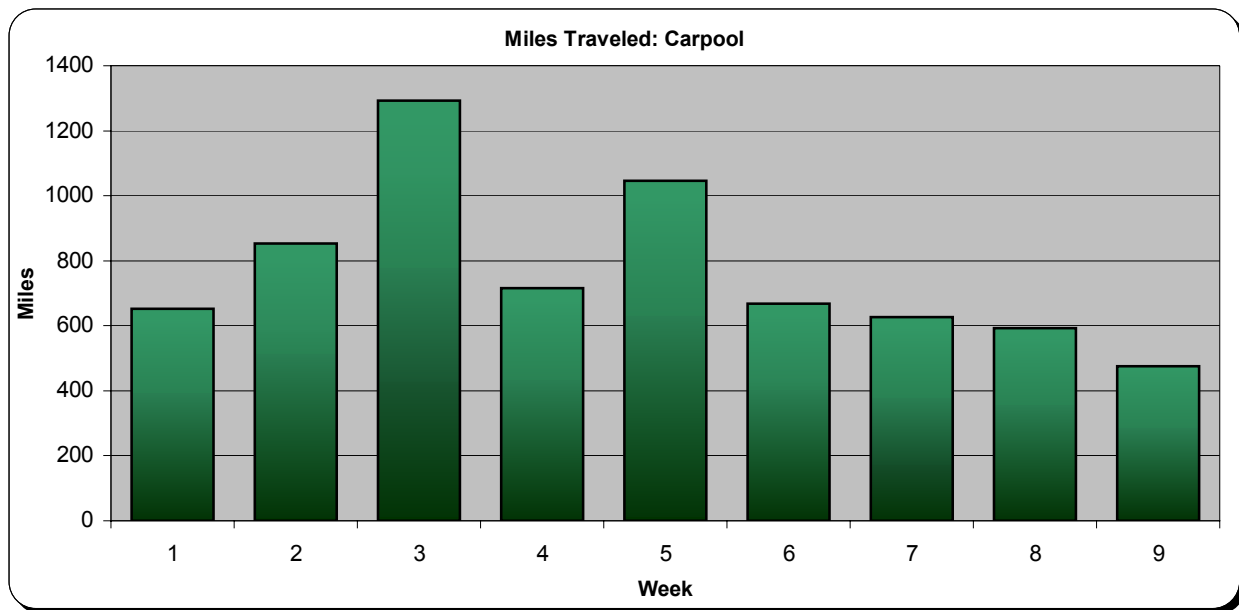


Figure 6: Miles Traveled Using a Carpool, (All Participants)

With respect to the use of carpools, there is variation among the weekly totals, though the variation does not appear to depend on the test variable, (use of a second owned vehicle). Part of the variation is because we experienced some confusion in how participants used the term “carpool” in their diary entries. Although the instructional material we provided clearly defined the use of the term “carpool” (and “vanpool”) in the diaries should refer to a carpool organized with others such as would typically take place for work or youth activities, some participants used the term to refer to any instance when two or more people rode in one car together. It took a couple of weeks into the 2001 Study to clarify the use of the word “carpool.” These results are also affected by the Smith carpool data, (and perhaps others as well). For some reason, I believe because their primary car broke down and they started using the bus, Smith’s use of carpools decreased significantly during the test period, from 317 miles per week to only 98 miles per week. This one statistic is having a large impact on the general results.

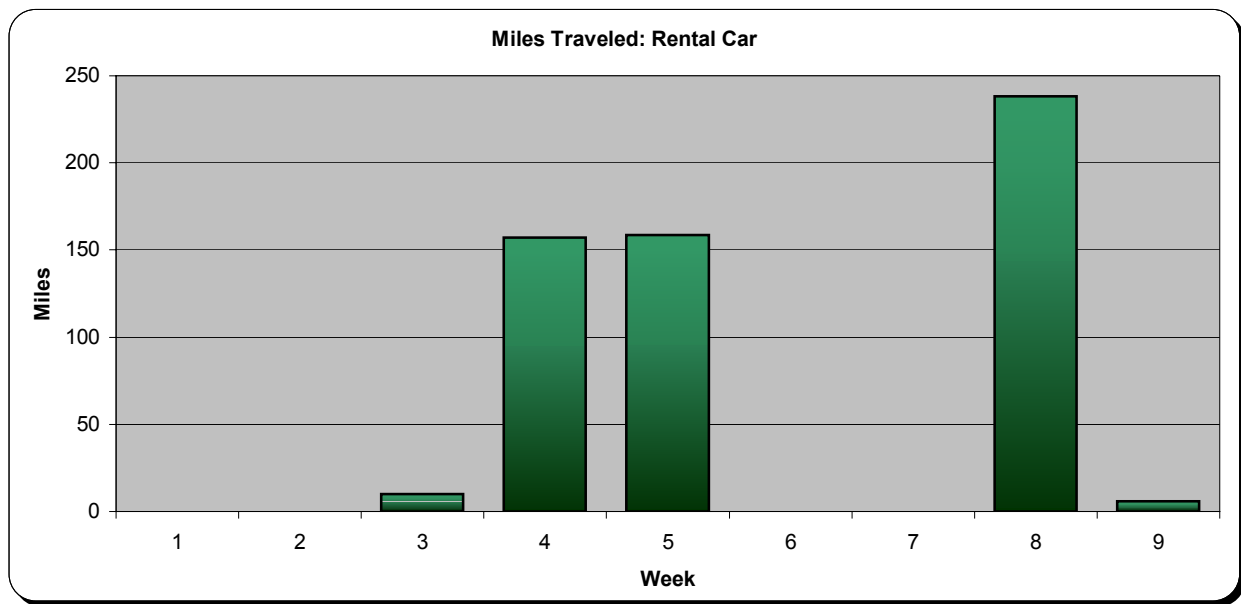


Figure 7: Miles Traveled Using a Rental Car, (All Participants)

The use of rental cars was virtually non-existent during the baseline period, (weeks 1 through 3). During the test period, however, the use of rental cars averaged 93 miles per week for all participants. This mode of transportation was used for occasional trips to the airport (saving the cost of airport parking), **but mostly when Car1 became inoperable.**



Figure 8: Miles Traveled Using a Taxi, (All Participants)

The use of taxis as an alternate mode of travel increased as expected during the test period, (weeks 4 through 9).

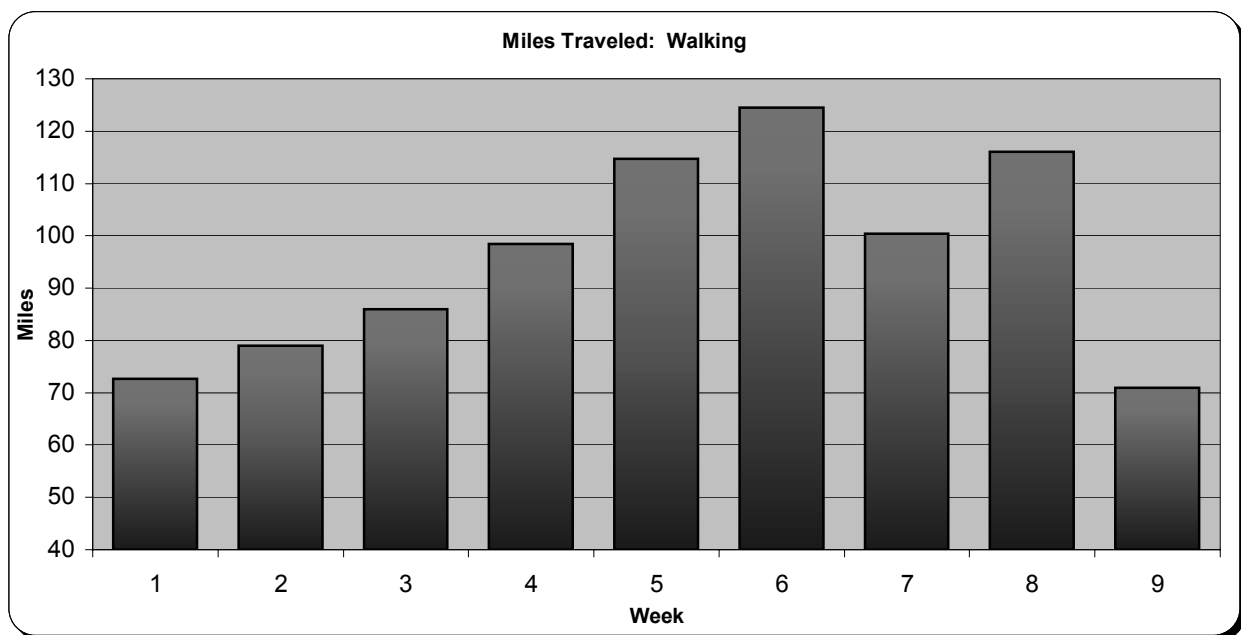


Figure 9: Miles Walked, (All Participants)

'Total miles walked' by all participants increased steadily during the first six weeks of the study, only to fall off sharply at the end of the test period, perhaps due to outside variables. Weather is one possible variable affecting this behavior, but as can be seen below, conditions were generally quite good during weeks 8 and 9. It does not appear that weather was a significant factor in the reduction in miles walked during weeks 8 and 9.

Graphs of Various Transportation Relationships and Comparisons, (Way to Go II)

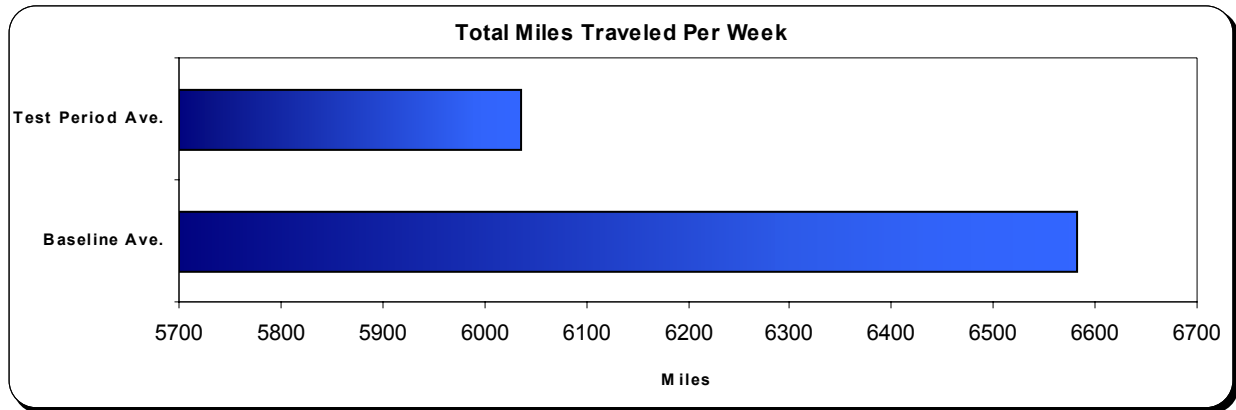


Figure 10: Total Weekly Miles Traveled, Baseline Average vs. Test Period Average, (All Participants)

Participants traveled a weekly average of 6,583 miles during the baseline period and a weekly average of 6,104 during the test weeks (weeks 4-9). The difference of 479 miles represents roughly a 7.3% decrease in total miles traveled. This general summary, however, hides interesting behavioral changes that can be seen in an analysis of the individual weekly totals. (See Figure 11)

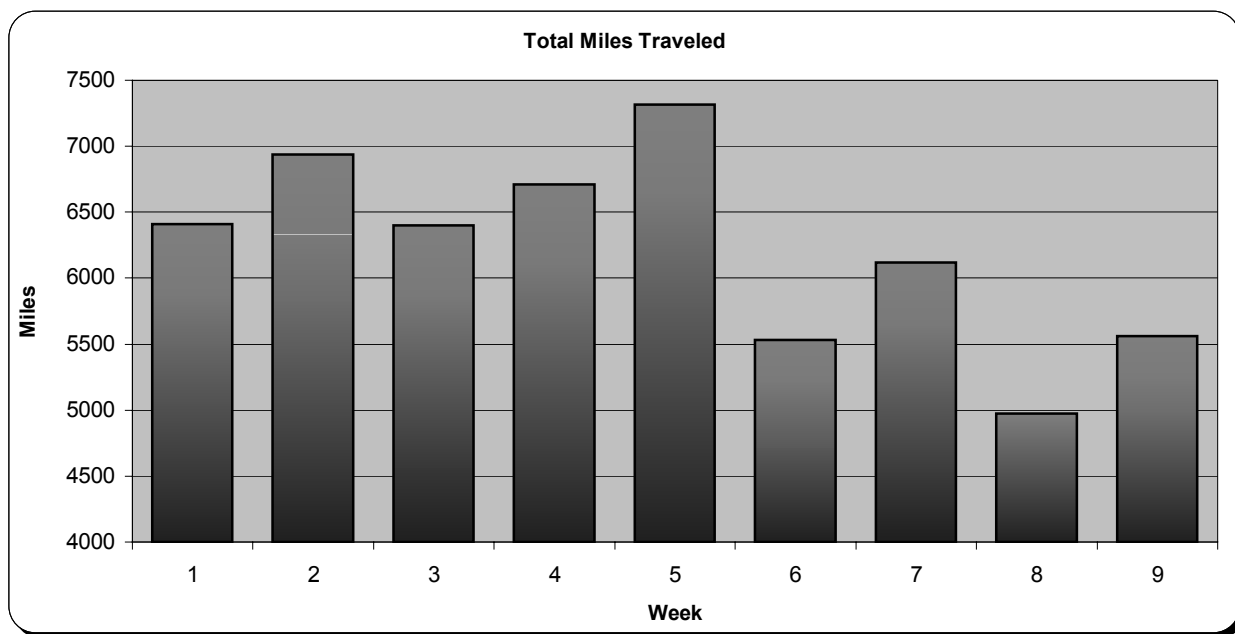


Figure 11: Total Miles Traveled Each Week, All Modes (All Participants)

As suggested by the data in Figure 1, total miles traveled by all participants remained at or *above* baseline levels during weeks 4 and 5, the first two weeks of the test period. During weeks 6 through 9, the participants not only traveled fewer miles than in their first two test weeks, but fewer miles than they did during the baseline period. The average miles traveled during weeks 6 through 9 were 5,649, or 14.2% less than the baseline weekly average of 6,583.

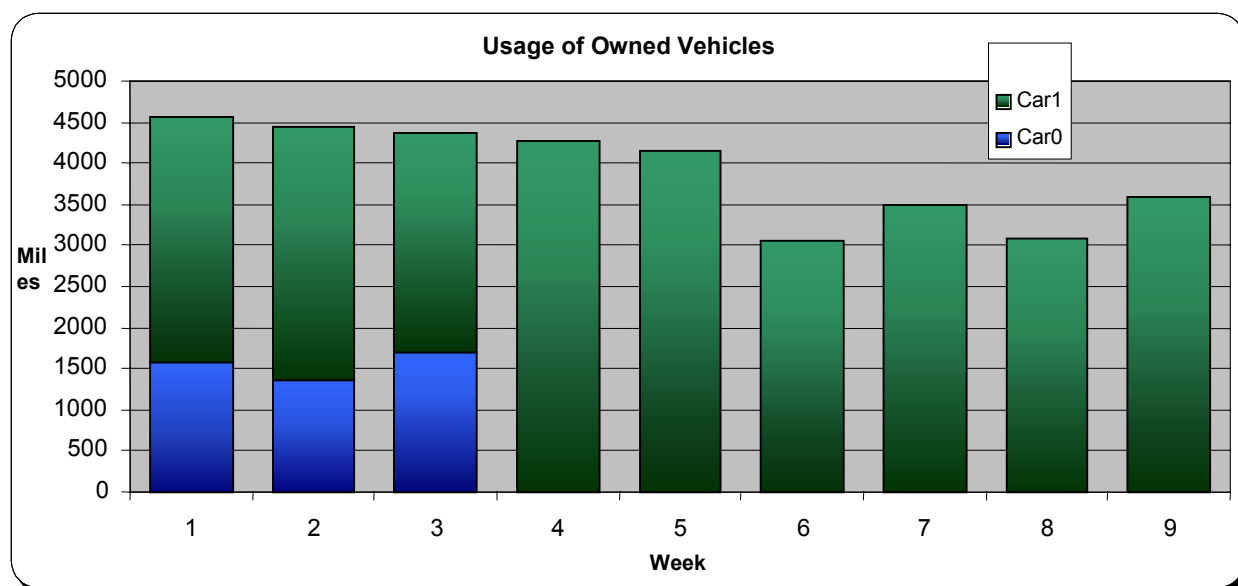


Figure 12: Miles Traveled in Owned Vehicles, (All Participants - Detail by Vehicle)

The graph reflects the total number of miles driven by all participants using their own household vehicles during the study, (Car0, Car1). The participants were instructed to discontinue use of Car 0 during weeks 4 through 9 of the study.

The graph indicates fairly consistent usage of owned vehicles during the baseline period, with about 4,500 miles being traveled by all participants each week. More variation in the use of primary vehicles is evident during the test weeks 4 through 9. A significant portion of the miles traveled in a household's second car, (Car0), are transferred to the household's primary car. Participants drove less, there is an apparent downward trend in the use of primary vehicles during the test period, as participants apparently adapted to the limitation imposed, and began finding alternative modes of transportation as well as combining or eliminating the number of trips. The use of a third 'owned' vehicle was not statistically significant during the study.

This data appears to indicate beneficial changes in behavior in that the overall usage of owned vehicles decreased following the baseline period. On the other hand, the use of alternate vehicles increased after the baseline period, when the participants were forced to discontinue use of their second automobile. For example, the use of taxis, borrowed cars, and rental cars all increased after the baseline period. (See, Figures 10, 6 and 9.)

The question that arises is whether, and to what extent, the participants simply replaced the use of their own second car with a borrowed car, taxi, or rental car. The question is important because if participants merely replaced trips that would have been made in their own second vehicle with equivalent trips in borrowed or paid vehicles, there would arguably be little or no identifiable benefit in the form of cost savings, pollution reduction, or decrease in traffic congestion.

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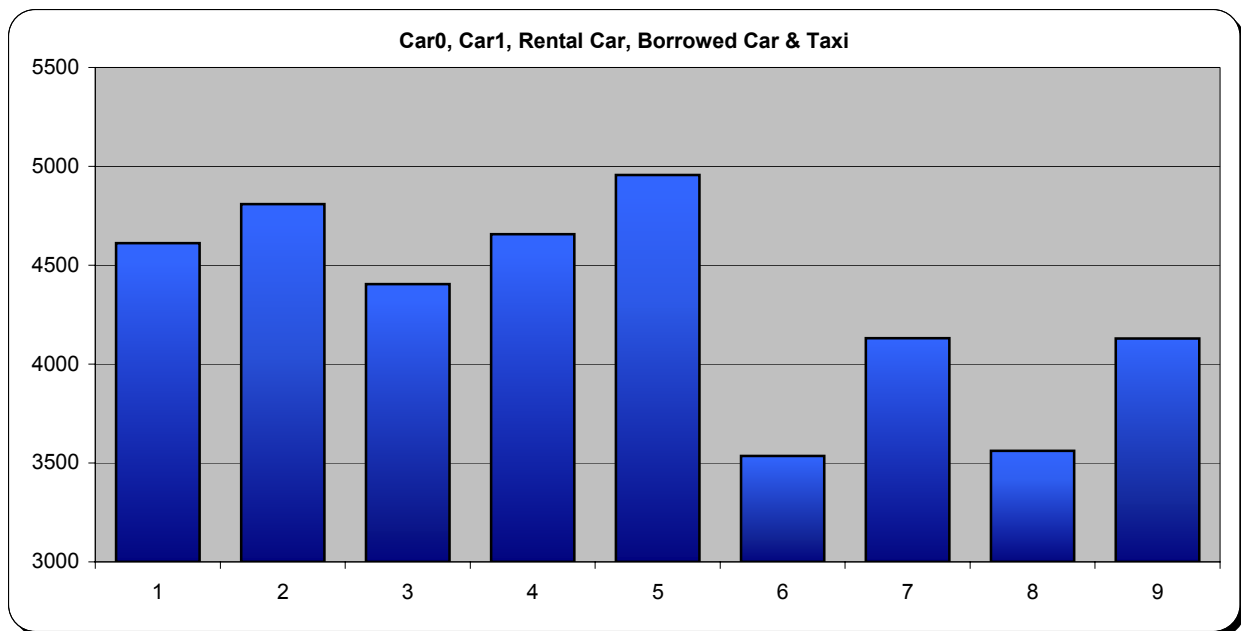


Figure 13: ‘Low-Occupancy Vehicle’ Usage Compared, (All Participants)

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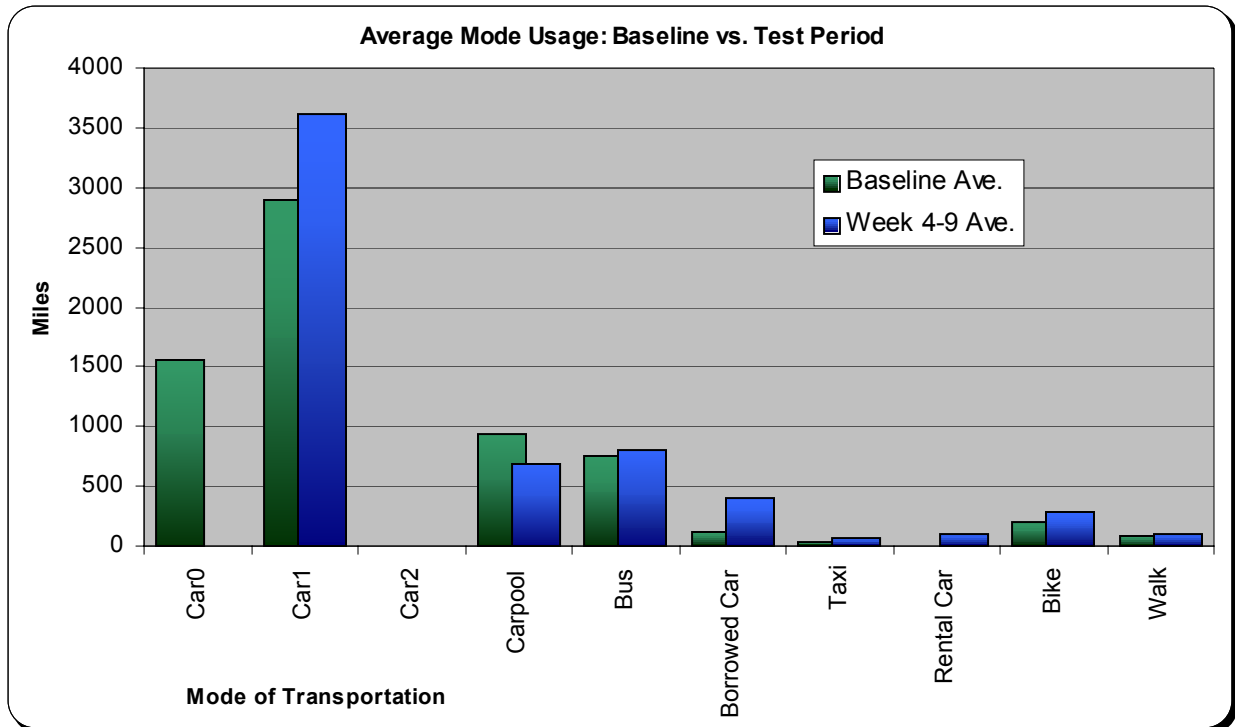


Figure 14: Average Mode Usage: Baseline vs. Test Period, (All Modes - All Participants)

The above graph compares the average weekly miles traveled for each travel mode during the baseline period and the test period.

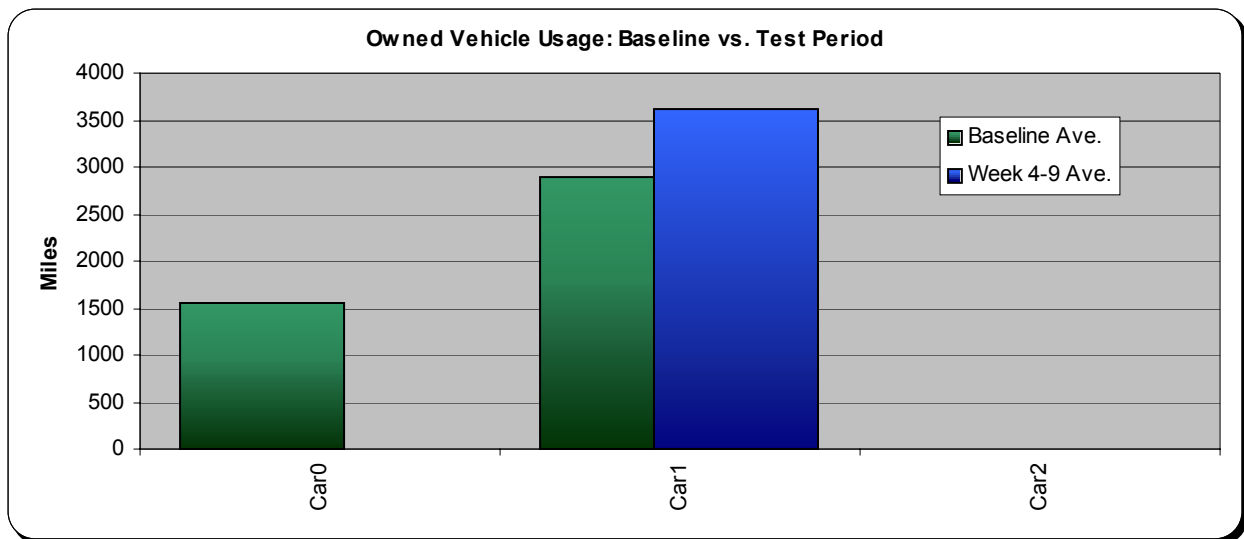


Figure 15: Average Mode Usage: Baseline vs. Test Period, (Owned Vehicles - All Participants)

Figure 15 compares the average weekly miles traveled for owned vehicles only during the baseline period and the test period.

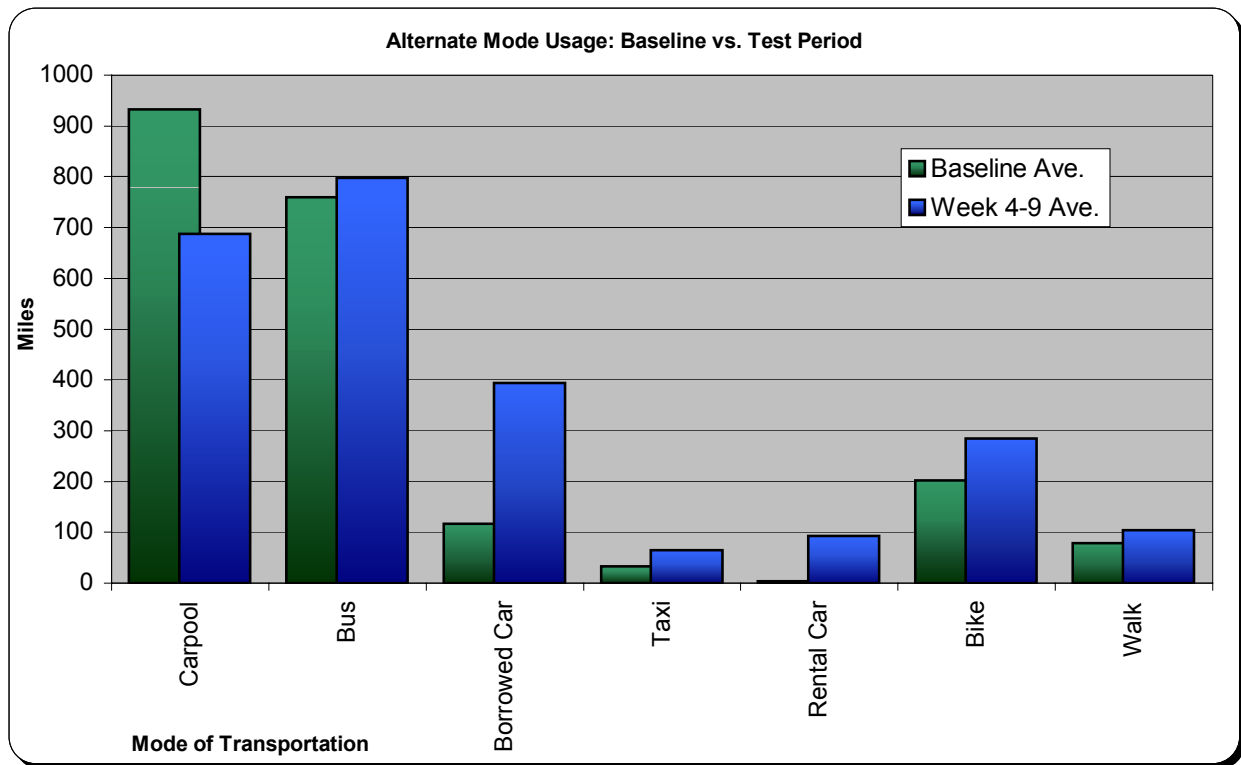


Figure 16: Average Mode Usage: Baseline vs. Test Period, (Alternate Modes - All Participants)

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Analysis of Travel Behavior Influenced by Children

Way to Go II

Relevant Data

The Way To Go Program Evaluations included a question that asked each participant what their children thought of the program, if they had children. Nine of the twenty-three households had children. Only three households had children of driving age. Eight households had children below driving age (some of these had multiple children, some of whom were of driving age and some of whom weren't). Of those, five households had children too young to attend school yet (age 4 and under). Specific details follow:

Bainbridge: 2 adults in household, gave birth to only child during week of the study.

Barrett: 2 adults in household, they have 2 children both age 2. Often would drive car around and around through neighborhood in evening with kids as passengers in order to get their kids to fall sleep, then presumably move them into the house.

Goodwin: 2 adults in household, they have 3 children ages 16, 10, and 4. There is a reference to a son in baseball. No reference to any impact of school on travel decisions.

Hemingway: 2 adults in household, and 3 children ages 14, 11, and 7.

Knebel: 2 adults in household, and there are 2 children ages 6, and 3. They were apparently "too young to think about" the WTG program.

May: One child. 2 adults in household, and one child age 2.

Mincemoyer: 2 adults in household, and 2 children ages 17 and 14. Apparently neither was driving during the study.

Nevue: 1 adult in household; two children ages 11 and 7 (Nevue was one of the participants that gave up her primary car as she only had one vehicle). Had great difficulty coordinating between different modes of travel to get from work to after-school/child care in time to avoid late pick-up charges.

Watness: 2 adults in household, and 1 child age 16. Their daughter was identified as one of the drivers for purposes of the study.

Evaluation Question and Anecdotal Information

The End of Program Evaluations asked only one question specifically relating to children. The question was, "If you have kids, what did they think?" This question was presented in conjunction with another, related question that asked, "Was it hard to convince other people in your household to do it?" While some of the households without children might have written "n/a" in response to the first question, most participants simply combined the two questions and offered a single response.

Of the 22 evaluations received, 3 households stated it was hard to convince others to participate in the program, 3 households stated it was not hard, and for 16 households they marked the question as not applicable.

The evaluations were also perused in an effort to find any anecdotal information relating to the impact of children or school on transportation decisions. Nevue, a participant that gave up her one and only car,

described how school being in session affected her total cost of transportation. In answer to the question regarding relative costs when giving up a car, she answered the following:

When school in session essentially just \$3 per week (my portion of bus pass)—plus one weekend rental car \$35. When school out—related to childcare cost \$31. (Taxi \$7. x 4 per week). Much cheaper not to own car.

When asked whether the participant would consider selling their extra car and what their motivations would be when considering that issue, the Watness household (who did sell car in Dec 01) stated:

Once our 16-year-old gets back to school, life will be more complicated because she cannot bus to school and either needs to drive or needs a ride to and from school. For carpooling, the mornings work but the afternoons don't.

One evaluation pointed out that a child doesn't have to be in school to affect transportation decisions. The May household has a 2-year-old boy. "Our son is too young to have noticed a difference, although he was a factor in our decision to have Tom bike and keep the car at my disposal most of the time."

Way to Go I

Fourteen households turned in complete evaluation forms from the first Way To Go study. The evaluation forms for WTG1 asked one question regarding children: "If you have children, how did they adjust to the program?" The responses were as follows:

- 3 Adjusted Well
- 4 Adjusted Somewhat Negatively
- 7 N/A or Negligible Reaction

Four Households with School-Age, Non-Driving Children

(Note: Our data analysis consultant who produced this report did not know we had gone back and collected the more detailed information on households with children and their ages that is described above. The following tables only use data from the four households with school-age children the consultant was aware of at the time they produced this report. This will be revised with the complete data in a future edition of this report.)

We looked at the results for families with children in an effort to identify unique changes in transportation habits for this group. Specifically, the City is interested in how the end of the school year may have affected trips and miles traveled, presumably for those participants with school-age children in particular. This analysis would not be relevant to families with pre-school children.

The following analysis therefore culls data for only the following families with school-aged, non-driving children, (Goodwin, Hemingway, Knebel, Mincemoyer, and Nevue*). The table below calculates the total number of trips taken and miles driven each week for these four families. The data for trips and miles are then presented in graph form. According to the Seattle Public Schools' website, the last student day of the 2000-2001 school year was Friday, June 22, 2001. This was basically the end of week 6. Week 7 was therefore the first week of the summer vacation.

Week	Total # of Trips	Total Miles Driven
1	226	813.9
2	247	1004.8
3	262	657.2
4	239	956.5
5	256	638.9
6	240	478.1
7	210	508.2
8	177	607.7
9	187	672.4

*Ages of these families children are:

Goodwin	16, 10, and 4
Hemingway	14, 11, and 7
Knebel	6, and 3
Mincemoyer	17 and 14
Nevue	11 and 7

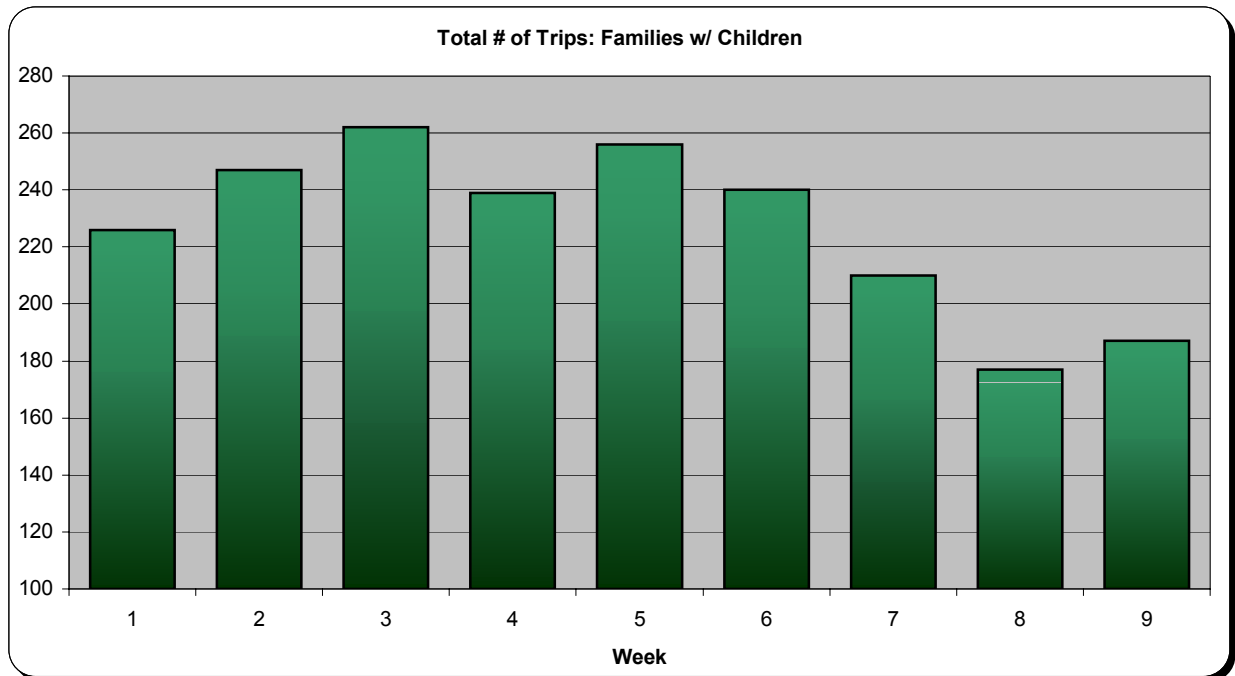


Figure 17: Total # of Trips: Families w/ School-Aged, Non-Driving Children

The graph shows the number of trips taken each week by five families with school-aged, non-driving children. Week 7 was the first week of summer vacation.

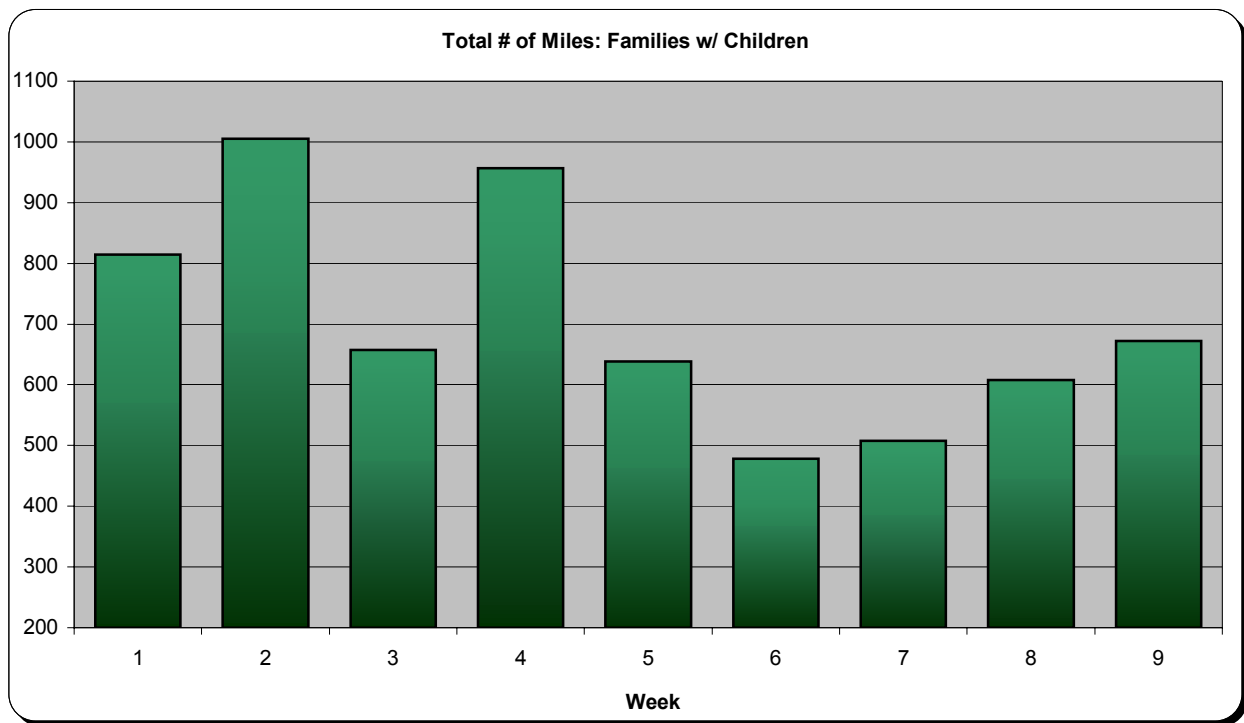


Figure 18: Total # of Miles: Families w/ School-Aged, Non-Driving Children

The graph shows the total number of miles traveled each week, (using all transportation modes), by five families with school-aged, non-driving children. Week 7 was the first week of summer vacation.

To further summarize the data, the following table identifies the weekly average number of trips and miles driven during the baseline period, (with school in session), during weeks 4-6, (with school in session and using “one less car”), and during weeks 7-9, (with school out and using “one less car”).

Weeks	# of Trips	# of Miles
1 to 3	245	825
4 to 6	245	691
7 to 9	191	596

The above table shows that for this small group of participants with non-driving children attending school, the number of trips per week didn’t change from the baseline period to the first three weeks of the test period. But once the school year ended, the number of trips for these households dropped about 22% to 191 per week.

For miles traveled, the relationships are different. The number of miles traveled dropped over 100 miles per week from the baseline period to the first three weeks of the test period. This indicates that the five families traveled fewer miles while making the same number of trips as long as their children were in school. Once the school year ended, the number of ‘miles traveled’ fell again, this time to an average of 596 per week, or roughly 21% less than the average during the baseline period.

The same data represented graphically:

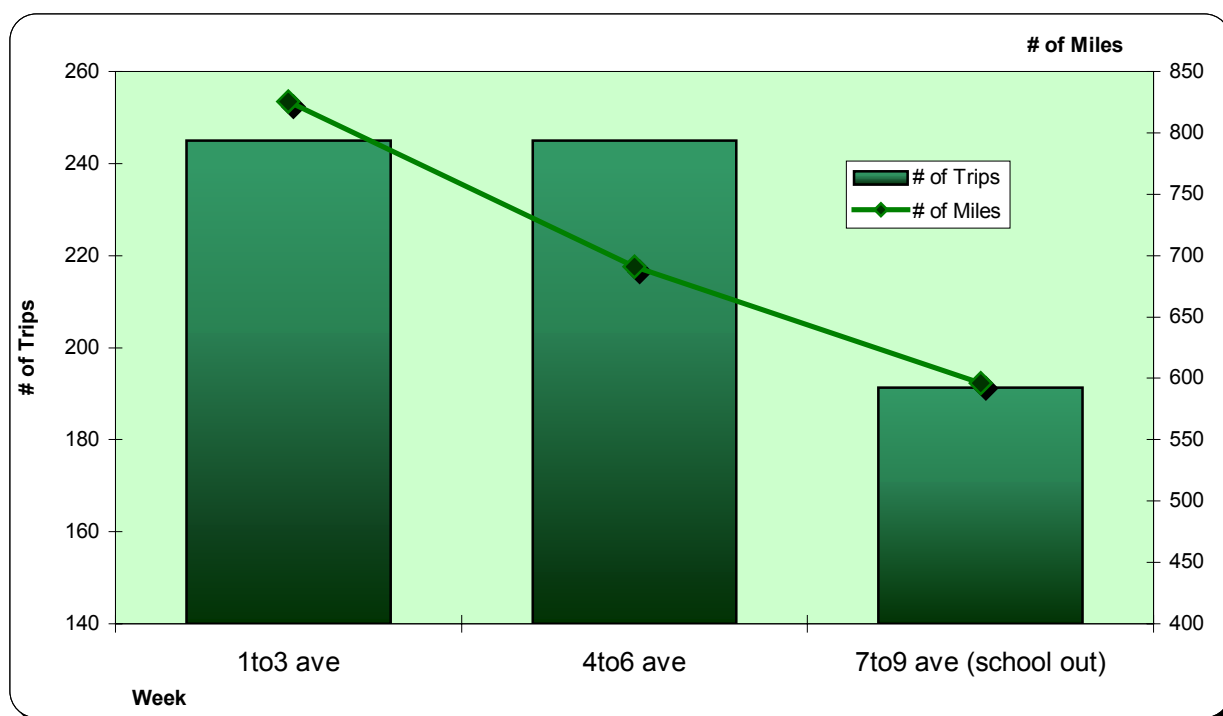


Figure 19: Trips and Miles Compared: Families w/ School-Aged, Non-Driving Children

The graph presents the weekly average number of trips and miles traveled for just the five participating families with school-aged, non-driving children. Week 7 of the study was the first week of summer vacation.

Analysis of Travel Behavior Influenced by Weather

Way to Go II

Relevant Data

As in the analysis of the impact of children, weather as an additional variable involves complications that hinder a thorough and reliable statistical analysis. The City has requested an analysis of weather impacting travel behavior. But weather of any kind does not arrive in a 'weekly' pattern. The variations mean we can not analyze the weekly data for weather impacts.

If the City would like the analysis of weather as an influence on transportation decisions to be the subject of more thorough analysis, perhaps a line could be added to future diary logs for a daily description of the weather. In an effort to provide historical daily weather information for analysis purposes by the City staff, I researched Seattle and SeaTac weather sites on the Internet. Information regarding daily weather conditions, precipitation amounts, high temperatures, and average wind speeds can be found below.

Evaluation Question and Anecdotal Information

The program evaluations asked one weather-specific question. "How much were weather and the time of year a factor in your choices? If it had been colder and rainier, would it have significantly changed your decisions (i.e. walking or taking a bus)?" From the evaluation responses, nine households concluded that weather was not a factor in their travel choices, while twelve households stated that weather was a factor that affected their decisions. (One of the evaluations turned in did not answer the question.)

The program evaluations provided participants the opportunity to describe generally how weather affected their experiences. The evaluations were not helpful in providing specific information about weather conditions on specific dates. One participant referred to conditions where it "rained hard." Another said the weather was "ideal" for them during the six weeks of the test period.

Anecdotally, comments on how weather influenced travel decisions covered a wide range of attitudes:

Yes. I hate walking in the cold, rainy weather. [Atchison]

This study has shown me how MUCH weather plays a part in the decision to walk or take the car. A car is a huge convenience when it is cold and/or raining. It's a convenience though, not a necessity. [Goodwin]

Honestly, I do believe that weather would significantly change our decisions. [Hoang-Braddock]

No. Joe and I are both from Seattle. We like the rain. We did end up buying a few extra umbrellas! [Hust]

Yes! I am not sure that I could have completed the study if the weather was colder! [Ichikawa]

Weather had no effect. In the winter with the car it is a pain to scrape windows. But walking or taking the bus rain/cold not make too much difference - just dress appropriately. [Nevue]

Way to Go I

The evaluation forms submitted following the WTG1 program included one question regarding weather: "If it had been colder and rainier would it have significantly changed your decisions i.e. walking or taking a bus?" The responses were as follows:

- 7 No or Generally No
- 6 Yes or Probably Yes
- 1 Unsure

Detailed statistical information to study the impact of weather on the transportation behavior of WTG1 participants was not readily available, but could be developed if desired.

Interestingly, precipitation during the study was generally never worse than a "light rain." Only very few days were described as even having light rain. Three days had rainfall of ½ inch or more, all in different weeks of the WTG program. There was possibly too little variation in the weather conditions to really understand how inclement weather affects transportation decisions.

Weather Data

The weather data for Way to Go II is provided along with the precipitation graph below so that comparisons can be made of the information with other data from the WTG2 study as desired. The following daily weather data was recorded by Seattle and SeaTac weather stations.

Date	General Condition	Precipitation Amount (in.)	High Temp. (F)	Ave. Wind Speed
5/14/01	Light Rain	0.5	53.6	10.22
5/15/01	Scattered Clouds	0.13	59	5.64
5/16/01	Partly Cloudy	0.01	57.2	6.57
5/17/01	Partly Cloudy	0	55.4	2.76
5/18/01	Scattered Clouds	0	60.8	4.44
5/19/01	Partly Cloudy	0	60	4
5/20/01	Partly Cloudy	0	64.4	7.63
5/21/01	Partly Cloudy	0	64.4	6.44
5/22/01	Partly Cloudy	0	82.4	6.39
5/23/01	Partly Cloudy	0	84.2	6.53
5/24/01	Partly Cloudy	0	69.8	4.6
5/25/01	Partly Cloudy	0	75	5.98
5/26/01	ND	0	74	ND
5/27/01	ND	0	68	ND
5/28/01	Partly Cloudy	0.12	53.6	10.99
5/29/01	Partly Cloudy	0	60.8	3.69
5/30/01	Mostly Cloudy	T	69.8	5.14
5/31/01	Partly Cloudy	0	84.2	3.79
6/1/01	Light Rain	0.18	60.8	10.13
6/2/01	Scattered Clouds	0.14	55.4	9.46
6/3/01	Partly Cloudy	0.01	57.2	5.88
6/4/01	Partly Cloudy	0	53.6	2.68
6/5/01	Scattered Clouds	0.04	59	6.25
6/6/01	Partly Cloudy	0.03	62.6	5.33
6/7/01	Partly Cloudy	0	73.4	4.37
6/8/01	Partly Cloudy	0	73.4	5.9
6/9/01	Mostly Cloudy	0.1	55.4	5.75
6/10/01	Partly Cloudy	0.02	53.6	6.21
6/11/01	Light Rain	0.98	53.6	5.35
6/12/01	Partly Cloudy	0.24	57.2	5.49
6/13/01	Partly Cloudy	0	64.4	1.97
6/14/01	Scattered Clouds	0	60.8	3.45
6/15/01	Partly Cloudy	0	62.6	6.42
6/16/01	Partly Cloudy	0	62.6	8.7
6/17/01	Partly Cloudy	0	62.6	6.33
6/18/01	Partly Cloudy	0.05	66.2	5.75
6/19/01	Mostly Cloudy	0	77	6.48
6/20/01	Partly Cloudy	0	78.8	4.76
6/21/01	Partly Cloudy	0	75.2	5.75
6/22/01	Partly Cloudy	0	57.2	11.51
6/23/01	Partly Cloudy	0	63	4.32

6/24/01	Partly Cloudy	0.15	53.6	9.78
6/25/01	Partly Cloudy	0	66.2	8.19
6/26/01	Partly Cloudy	0	73.4	6.13
6/27/01	Light Rain	0.54	60.8	2.93
6/28/01	Partly Cloudy	0	64.9	6.77
6/29/01	Partly Cloudy	0	69.8	6.79
6/30/01	Partly Cloudy	0	64.4	3.8
7/1/01	Partly Cloudy	0	69.8	4.97
7/2/01	Clear	0	77	7.56
7/3/01	Partly Cloudy	0	80.6	5.18
7/4/01	Partly Cloudy	0	77	4.43
7/5/01	Partly Cloudy	0	66.2	6.04
7/6/01	Partly Cloudy	0	69.8	4.76
7/7/01	Clear	0	73.4	5.18
7/8/01	Clear	0	77	5.51
7/9/01	Partly Cloudy	0	80.6	5.9
7/10/01	Partly Cloudy	0	78.1	4.88
7/11/01	Partly Cloudy	0	66.2	3.1
7/12/01	Partly Cloudy	0	73.4	3.61
7/13/01	Partly Cloudy	0	66.2	5.04
7/14/01	Partly Cloudy	0	64.9	6.73
7/15/01	Partly Cloudy	T	59	5.71

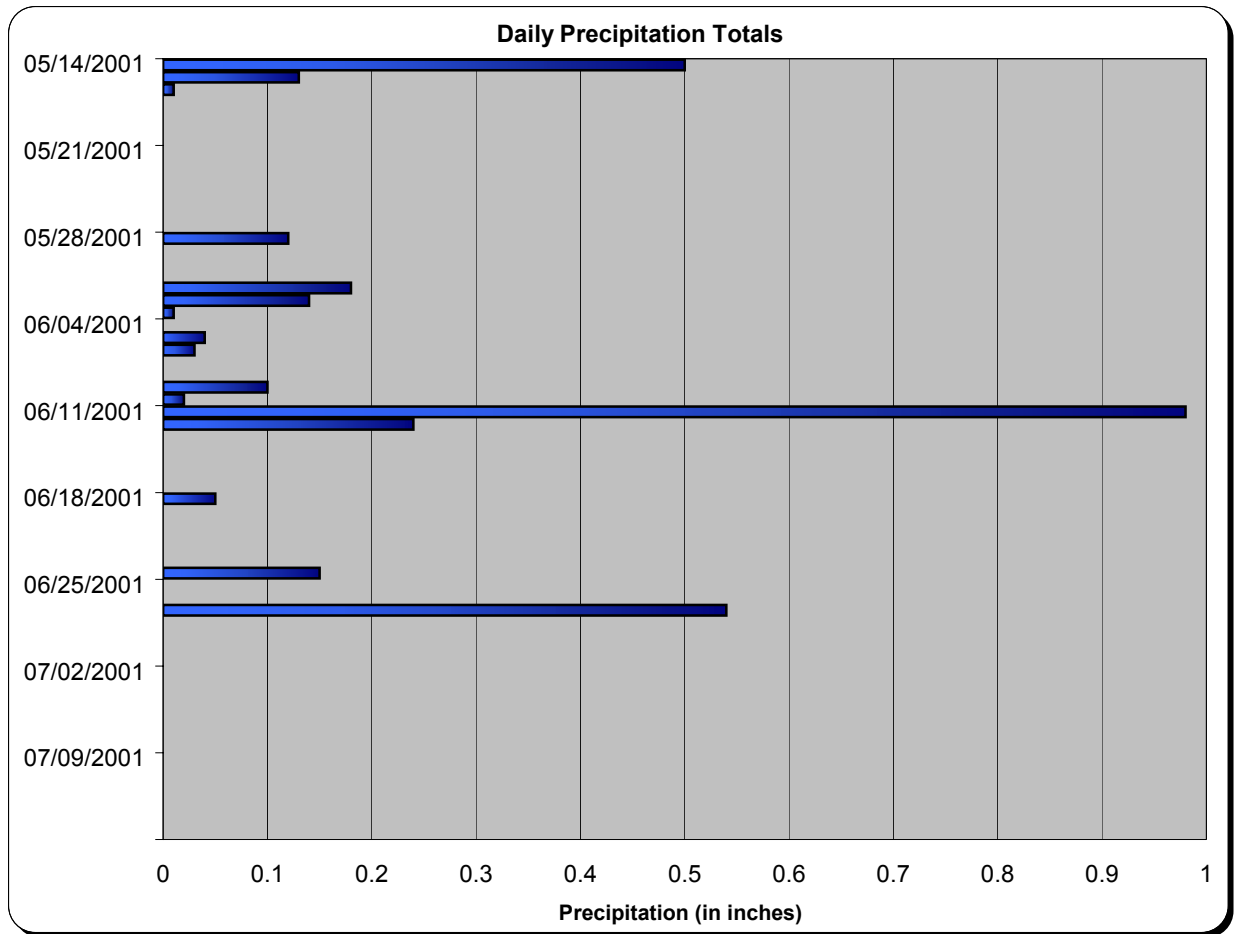


Figure 20: Daily Precipitation Totals

Analysis of Travel Behavior - Changes in *Amount* of Travel vs. *Mode* of Travel

Evaluation Questions and Anecdotal Information

The question of how participants changed the *amount* they traveled as opposed to the *way* they traveled is one of the more important and difficult issues to analyze. The reality is that participants didn't do just one or the other. Over the course of the six test weeks, every one of the participants cut back on a trip, combined two trips that might have been made separately or postponed a trip, while making "normal" trips using different modes of transportation. The evaluation questionnaires phrased this issue as a choice between two alternatives: Did they stop making trips? Or did they find other ways to make the same trips? The bottom line is, every participant could have answered "both," and many times, did just that.

The goal was to categorize the participants one way or the other based on how they weighted their own responses to these questions. In other words, did the participants believe that their own experience was primarily a change in *amount* or *mode* of travel? Attempting to categorize their answers was admittedly a subjective task, with the results as follows:

- 5 households said they cut back or combined their trips. (Amount and efficiency)
- 9 households said they made the same trips in other ways. (Mode)
- 8 households said they did both. (Both)

The program evaluations also asked questions regarding the use of taxis: "Did you ever try taking a taxi? If not, why not? If so, how was it? Did having the \$85 in your pocket help you get over the barrier about the potential cost of taking a cab?"

Eight participants stated that they had tried taking a taxi during the program, compared to 14 participants who did not.

When asked whether the \$85 incentive helped them get over the barrier of taxi cost, the answers were as follows:

- 4 Yes
- 11 No
- 7 Not Answered

Anecdotally, there were a variety of comments regarding the issue of *mode* vs. *amount*:

"We used other transportation choices to make many of the same trips. My husband ended up biking back and forth to work and discovered that he really enjoyed it. We also used the bus many times for trips that we would have usually used the car for. Before when I would have driven north for movies or shopping, I now headed downtown on the bus. It was a fun experience. Same movies, same shopping, but it was wonderful not having to deal with a huge parking lot and parking. We also found that "bus adventures" are a great deal on Sundays as kids ride for free!" [Goodwin]

"We combined errands and used the bus more." [Kielbowicz]

"We drove our remaining car a little more to make some of the same trips (for instance: Doctor appts. and errands), but Tom's decision to bike to

work every day was a major factor in our experience. I really didn't use other transportation." [May]

"Mostly, the same trips were made via public transportation, the use of FlexCar or on foot. The remaining car was driven somewhat more often, but not significantly." [Mincemoyer]

Analytical Analysis

The City has requested that data for the people who went the same places different ways be segregated and the behavior analyzed. There are at least two ways to accomplish this. The first is to segregate those households who responded to the evaluation questionnaire by saying they traveled the same places different ways. The second is to statistically compare the behavior of each participant in the baseline period and the test period, and segregate the participants who show the highest percentage shift to alternate modes of travel based on some arbitrary threshold test.

In the first option, nine of the twenty-three households felt that they primarily made the same trips in other ways. The nine households characterized in this manner are Atchison, Mincemoyer, Barrett, Hemingway, Hoang-Braddock, Knebel, Koch, O'Donnell, and Watness. However, the comparison of their baseline to Car1 showed perception was different than behavior. The surprising apparent inconsistency led to the following graph in which the same analysis is performed for all 23 participants.

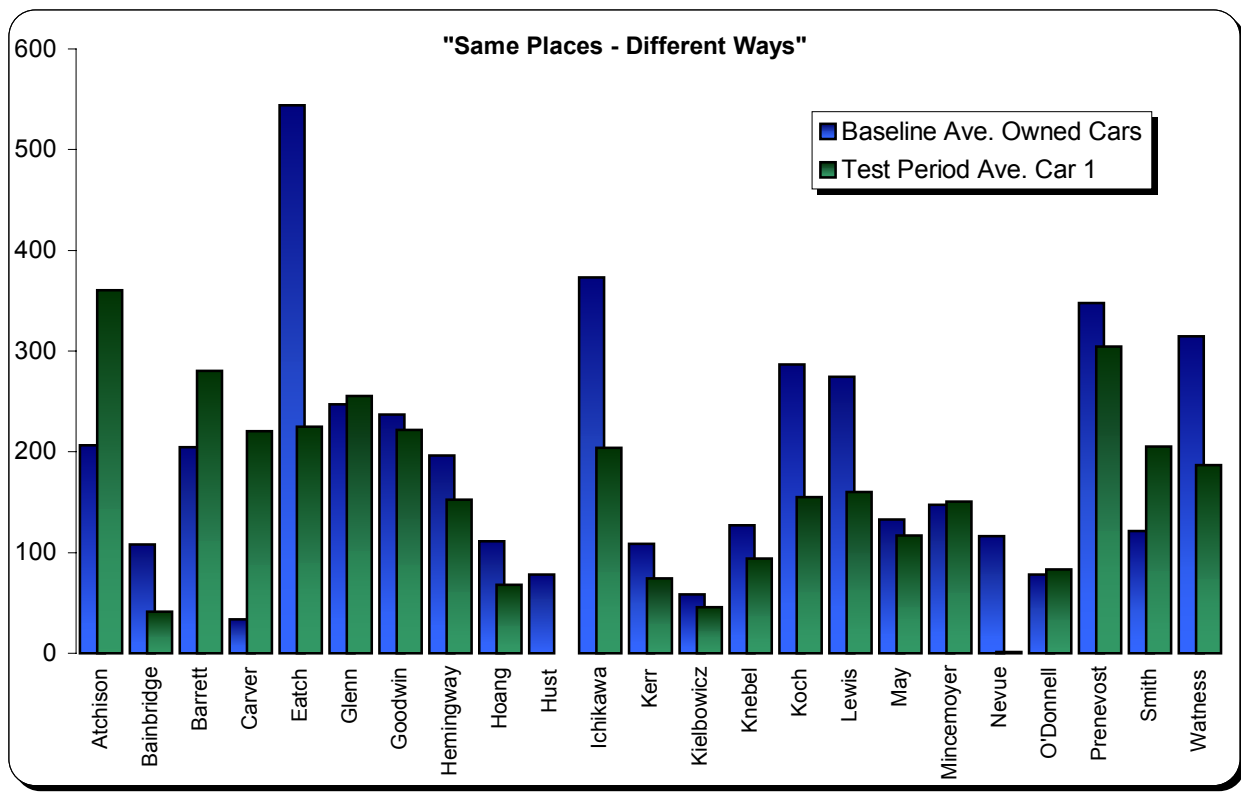


Figure 21: How Participants' Use of Owned Vehicles Changed

The graph compares weekly average miles traveled using Cars 0 and 1 during the baseline period with weekly average miles traveled using Car 1 during the test period for all participants.

We see from the above graph that we can't trust the participants' own characterizations of their behavior to be accurate. The effort to study the behavior of people who went the same places different ways is misleading when we use anecdotal information to identify which participants should be included in this group. With the new graph, certain things become obvious. For example, Hust and Nevue are the most obvious candidates for households that went to the same places in different ways. They *had* to go in different ways, because they gave up their only vehicle to participate in the study. Yet in the evaluations, Hust characterized her activity as one of cutting back trips, and Nevue said that she made her same main trips in other ways, but cut out leisure trips to the beach or park, (both). Overall, 16 out of the 23 households used Car 1 less in the non-driving period.

I then decided to approach the issue from another angle by comparing how each participant made use of 'green' forms of transportation. A comparison was performed for bike, bus, and walking modes because of the inconsistency in carpool data described in Figure 8. The weekly average during the baseline period for all participants was 1,041. The weekly average during the test period was 1,232. That's more than an 18% *increase* in miles traveled using these desirable modes of transportation, (and more in line with expectations).

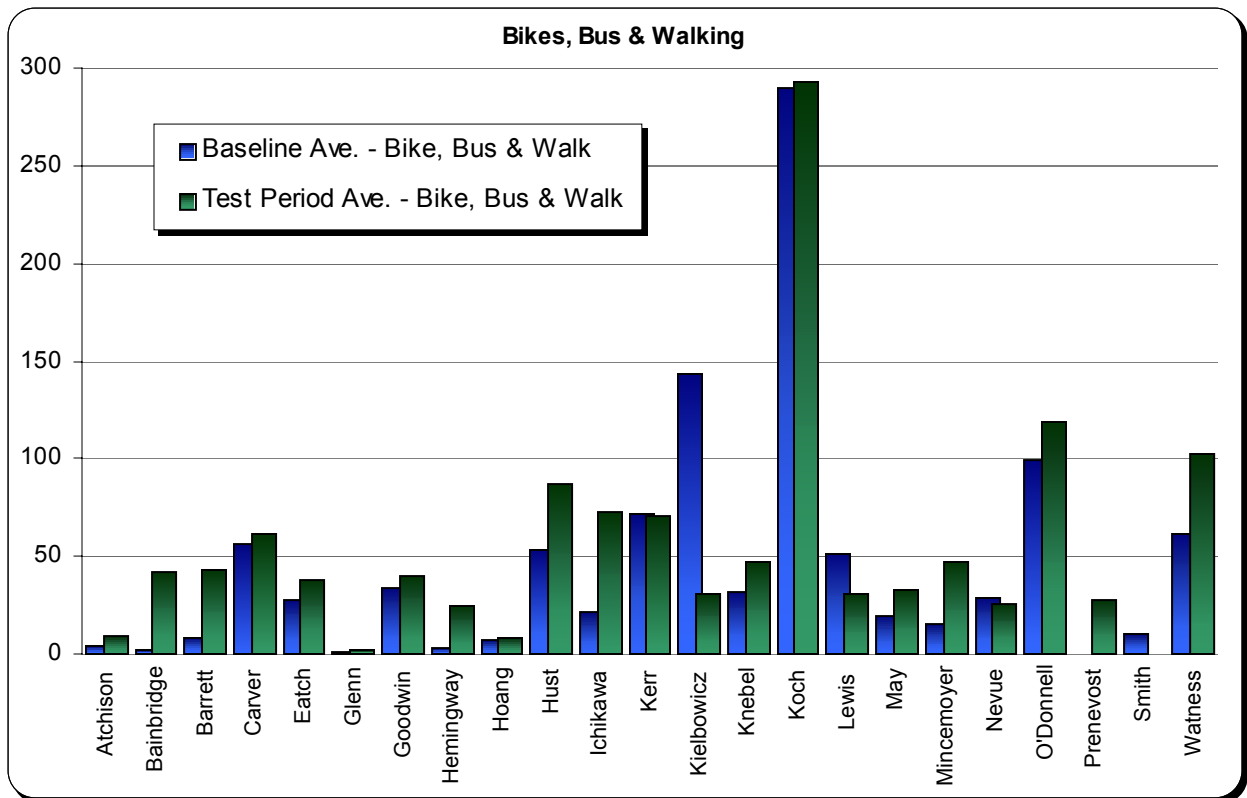


Figure 22: Changes in the Use of ‘Green’ Transportation Modes, Excluding Carpools

The graph compares weekly average miles traveled by bike, bus, and walking during the baseline period vs. the test period.

Seventeen of twenty-three participants (74%) experienced an increased use of these green modes of transportation. But admittedly, some of the changes were only very slight. The data still does not seem to lend itself to use as a threshold test for identifying households that ‘went the same places different ways’.

Previous correspondence with the City provided one solution: At one point, the City suggested that we arrive at this group by excluding people who made fewer trips or simply drove Car1 more. The analysis began by identifying participants who used Car1 less than they used all of their cars during the baseline period. Sixteen of twenty-three households passed this initial test.

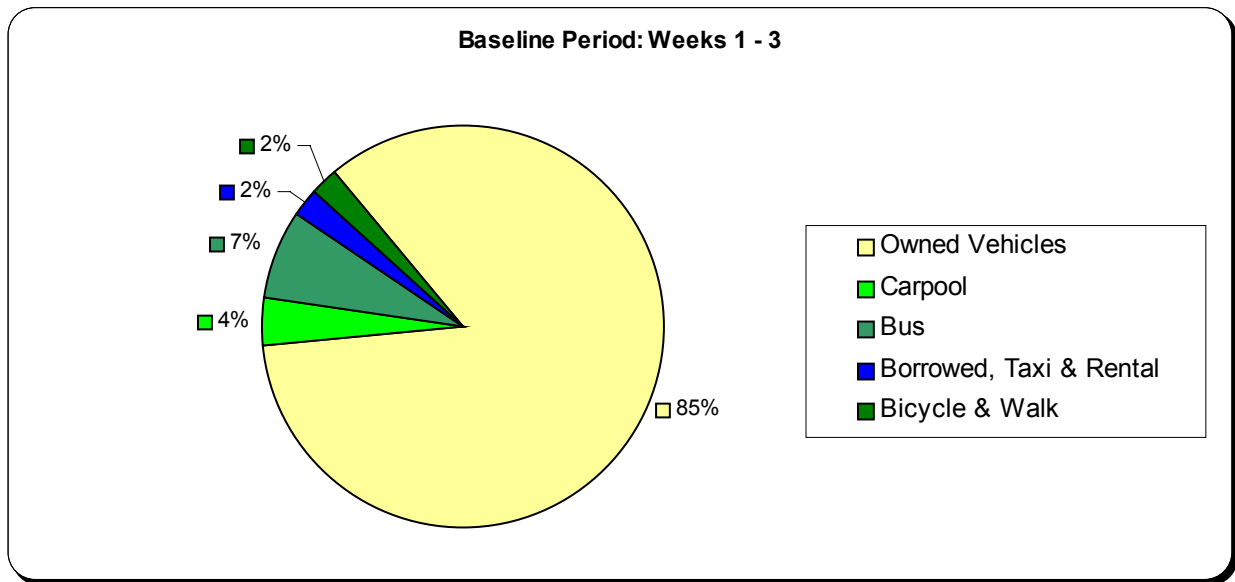
The participants that used 'owned vehicles' less during the test period included:

- 1 Bainbridge
- 2 Eatch
- 3 Goodwin
- 4 Hemingway
- 5 Hoang
- 6 Hust
- 7 Ichikawa
- 8 Kerr
- 9 Kielbowicz
- 10 Knebel
- 11 Koch
- 12 Lewis
- 13 May
- 14 Nevue
- 15 Prenevost
- 16 Watness

The next step suggested by the City was to identify and exclude those in this group that simply made fewer trips. The same list of participants who used Car1 less is presented below, with an additional column indicating the change in the weekly number of trips taken by each (change from baseline average to test period average).

	Participant	Change in # of Trips
1	Bainbridge	(3)
2	Eatch	(2)
3	Goodwin	(10)
4	Hemingway	(5)
5	Hoang	(11)
6	Hust	7
7	Ichikawa	(0)
8	Kerr	(3)
9	Kielbowicz	(2)
10	Knebel	(7)
11	Koch	(2)
12	Lewis	(20)
13	May	(5)
14	Nevue	1
15	Prenevost	3
16	Watness	(8)

After filtering the households by car use and number of trips, only four participants remained. The four are Hust, Ichikawa, Nevue, and Prenevost. (Hust and Nevue gave up their 'only' car as opposed to their extra car.) Pie charts were created depicting the travel behavior of this group, both during the baseline period and during the test period. For comparison purposes, pie charts were also created to demonstrate the travel behavior of the entire group as a whole, (again for the baseline and test periods). The resulting four pie graphs follow:



**Figure 23: Transportation Modes Used During Baseline Period
(4 Participants who ‘Went the Same Places Different Ways’)**

Based on total miles traveled during the period using the described modes of transportation.

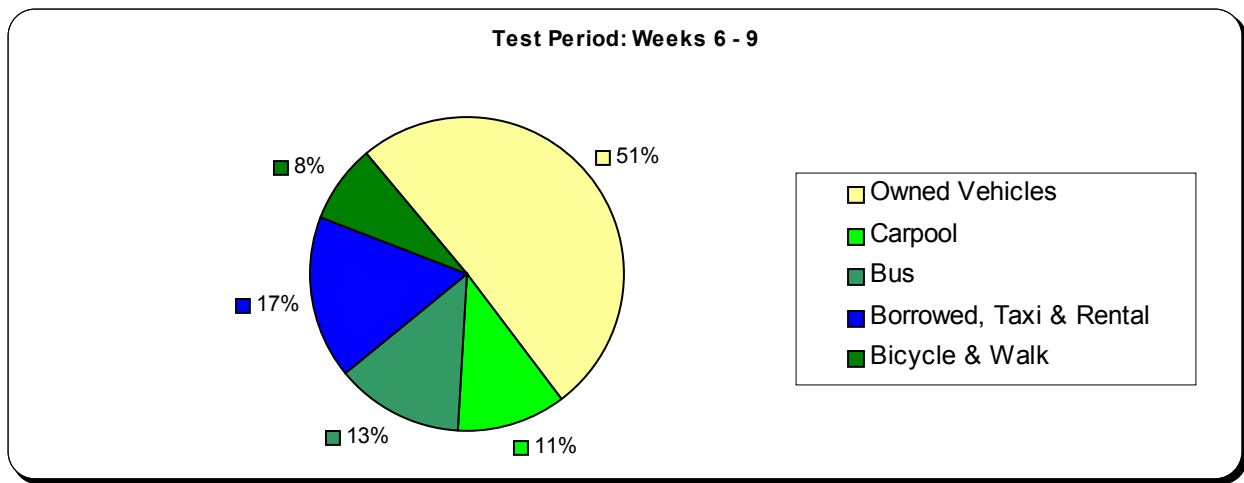


Figure 24: Transportation Modes Used During Test Period

(4 Participants who ‘Went the Same Places Different Ways’)

Based on total miles traveled during the period using the described modes of transportation.

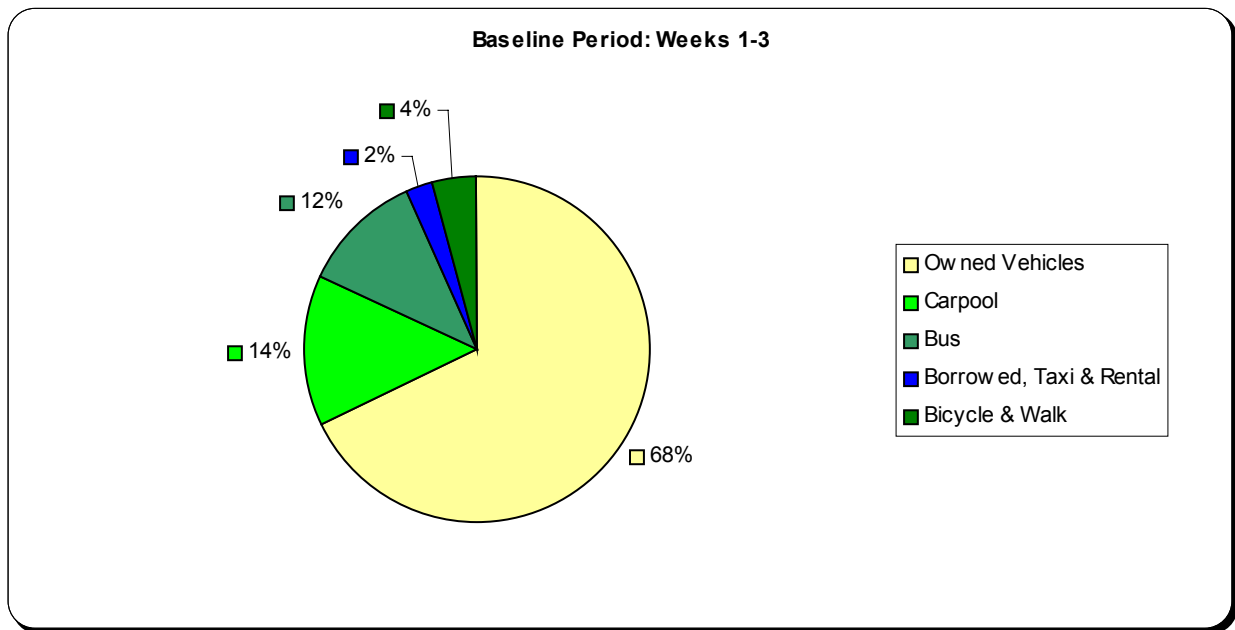
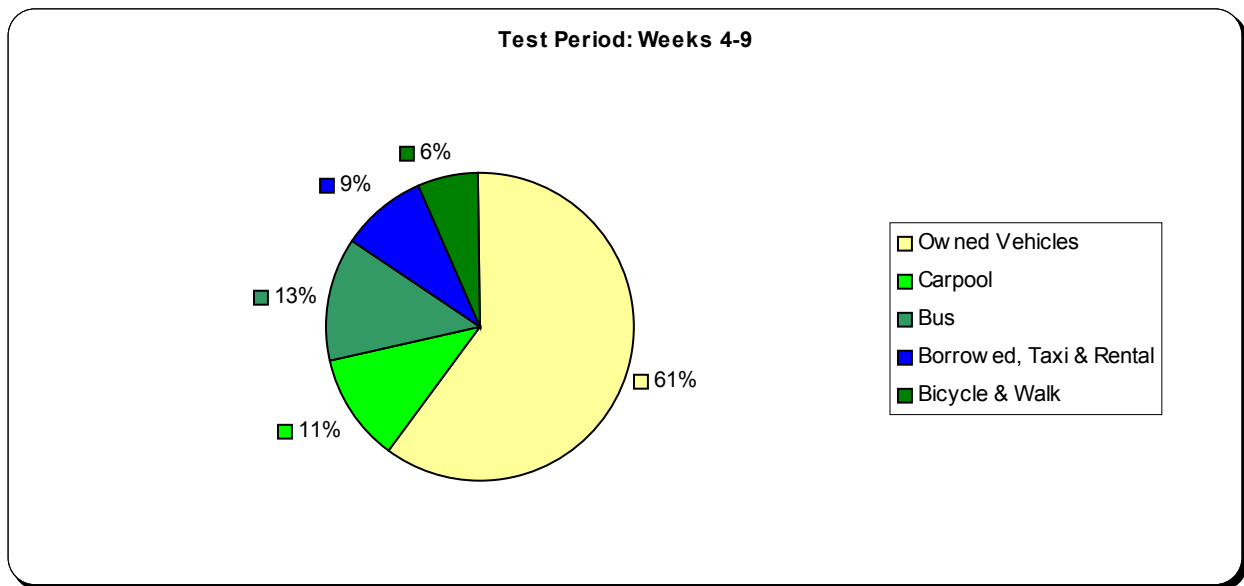


Figure 25: Transportation Modes Used During Baseline Period (All Participants)

Figure 25 describes the transportation mode choices made by all study participants during the baseline period. The data is based on total miles traveled during the period using the described modes of transportation.



**Figure 26: Transportation Modes Used During Test Period
(All Participants)**

Figure 26 describes the transportation mode choices made by all study participants during the test period. The data is based on total miles traveled during the period using the described modes of transportation.

Issues with the Statistical Analysis

The data relating to carpools should be studied in greater detail. It appears that there may have been some confusion among the participants about what constituted a carpool for purpose of the diaries (this is discussed on page 15 in the 'One-Less-Car' Demonstration Study Preliminary Report). The resulting totals do not seem consistent with the expected result or the other behavior recorded by the group. As can be seen in Figure 16, the average usage of *every* transportation mode alternative went up during the test period *except* for carpools. Additional analysis for potential problems or reasons for the unexpected behavior should be considered.

Way To Go I

The diaries used in the Fall 2000 Study did not ask specifically whether the participants traveled less or went to the same places in different ways. Therefore, little or no anecdotal evidence is available to segregate households who changed their *mode* as opposed to *amount* of travel. Further, as we learned in the Spring 2001 analysis, the participants' characterizations are not reliable indicators of their conduct anyway.

Finally, since the raw data for the Fall 2000 Study was compiled and summarized differently than in Spring 2001, there are no summary analysis spreadsheets available that compile each participant's experiences by mode for the baseline and test periods. For Spring 2001, we identified families that used their own car less during the test period *and* made fewer trips during the test period. To perform this same analysis for Fall 2000, the work would have to begin at the weekly diary level.

Suggestions for Further Study

While examining the data, several ideas for additional consideration suggested themselves. Some were discussed in the body above. Others are presented here:

1. It would be interesting to study the behavior of the participants six months or a year following the end of this study. The same participants could be hired once again to maintain a log without any limitation on their transportation choices such as giving up a car. This would depict the longevity as well as the degree of the participants' actual longer-term behavioral changes. This is planned for the 3rd Demonstration
2. Slightly more than half of the participants decided to keep their second car, even though they might be making a much greater effort to leave it parked and take advantage of other transportation modes. This has a dramatic bearing on costs. These participants might be saving the marginal cost of fuel, parking, and perhaps some maintenance. As an idea for further study, should we calculate the minimal cost savings if we assume all of the fixed costs of owning the vehicle are counted in the analysis?
3. Before any analysis was started, the data was first culled for vacation miles so that vacation travel would not skew the data for typical travel behavior. But the act of removing vacation miles skews the data, too. In one sense, vacation travel is a normal component of a household's total transportation history. The question is whether the methodology that resulted in the elimination of vacation miles had an unintended effect on the conclusions drawn. If the average weekly vacation travel by all participants didn't change from the baseline period to the test period, then an argument could be raised that a true overall reduction in trips and miles traveled was the positive result of conscious decisions by the study participants. Unfortunately, we removed more miles as vacation miles during the test period than we did during the baseline period. On average, we removed about 200 more miles per week during the test period than during the baseline period. The question is how that additional 200 miles per week compares with claims for miles saved? What if total miles traveled during the test period was reduced precisely because people were vacationing more and not in town making their "normal" commutes?

